



Influence of outdoor temperature and humidity on the methacholine challenge test

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Abstract:

Objective of this study was to evaluate whether outdoor temperature and humidity can influence methacholine test results in outpatients living in temperate areas. 4,723 subjects (2,391 males; age: 35.1 ± 16.15 ; FEV 1 Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 100.36 % [relative interquartile range (IQR):92.34-108.8]) that performed methacholine tests for suspected asthma between 2000 and 2010 were considered. Outdoor minimum, mean, and maximum temperature values (C), relative humidity (%), and dew point (T dp), registered when performing the tests, were examined. Airways hyperresponsive patients, with PD20 (provocative dose to obtain a 20 % fall in FEV1) $<3,200 \mu\text{g}$ were 2,889 (61.2 %) and median PD20 was $359 \mu\text{g}$ [IQR:160-967]. On receiving operating curve (ROC) analysis, temperature, humidity, and T dp did not significantly predict airways hyperresponsiveness (AHR), even using a 200, 800, and $3,200 \mu\text{g}$ cutoffs to identify AHR. When subjects were subdivided into subgroups, according to different levels of temperature, humidity, and dew point, no differences in PD20 and prevalence were found. Only a higher number of hyperresponsive subjects was detected in smokers when they were tested in hot and humid conditions. A weak but significantly positive relationship between PD20 and mean, maximum, and minimum temperatures was detected in severe hyperresponsive subjects ($\text{PD20} < 200 \mu\text{g}$) (r Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.100, 0.112, 0.110, respectively; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.001). The regression logistic model showed that maximum temperature was a significantly protective factor for AHR (OR:0.995, 95 % CI: 0.982-0.998; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.012) especially in severe hyperresponsive subjects (OR:0.988, 95 % CI: 0.977-0.999; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.035). In conclusion, weather conditions do not seem to influence PD20 values obtained with methacholine tests in real life. Hot and humid environments may increase the prevalence of AHR in smokers while a temperature increase may reduce the AHR risk especially in severe hyperresponsive subjects.

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Resource Description

Exposure : ☐

weather or climate related pathway by which climate change affects health

Meteorological Factors, Temperature, Other Exposure

Other Exposure: dew point

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Italy

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Respiratory Effect

Respiratory Effect: Asthma

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Other Vulnerable Population: Smokers

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content